L1 Global Planning

- The Scrubbing meeting is planned for Nov 23-24 at BNL
  - This is an exercise that should give the NSF some information about what scope of project we are proposing, how much it costs, and who would be involved
  - The projects won't be exactly the final projects as the designs and budget will evolve over time

- L1 Global is assumed to include
  - Data Aggregator
  - Event Processing Board

- The proposed US contributions are for
  - DOE funded data aggregator at a lab
  - NSF funded firmware and support at universities

L1 Global Planning

This discussion is focused on the firmware
- It is probably too costly in core for the US to take on a major part of the processor design in addition to the Aggregator board
- If smaller control board needs emerge during the design this could be revisited

L1 Global Algorithm needs are very extensible
- Some what like the current L1 Topo, one can add more and more algorithms
- Some "core" algorithms are clearly needed that seem to be the focus of US interest:
    - Topological clustering: Oregon, MSU
    - Jet finding/Fat-jet discrimination/HT/MHT/4-jet: Chicago, Indiana, LSU, Pitt
    - Penn (not a planned L1 Global contributor) has been doing studies of using tracking to reduces the pile-up in 4-jets (one of the core L1 track arguments)

L1 Global Planning

Firmware in what? FPGA vs GPU not determined

From current IDR text:

Some of the jet algorithms are well suited to implementation on conventional FPGA. The RoI-based algorithms and the more iterative jet algorithms would rather suit a GPU (as CUDA-based kernels) or possibly OpenCL-based kernels again on FPGA.

There would need to be some form of processor for overall management.

Possible implementations therefore range from:
- a PC blade with a commercial PCIe GPU card and custom FPGA card, were GPU to be the best kernel system,
- a dual FPGA module with embedded processor, where such a system could have significantly more I/O between the FPGA than is possible over PCIe.

L1 Global Planning
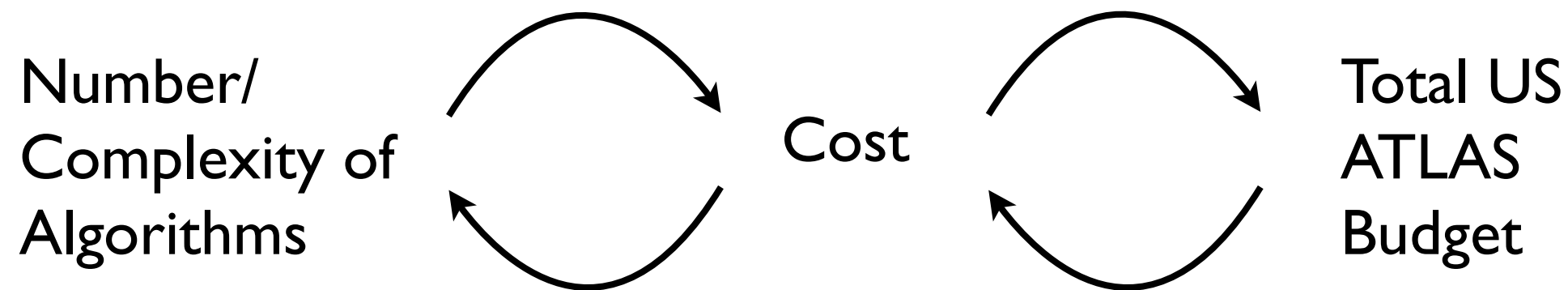
How do we determine a set of algorithms/tasks:

Number/
Complexity of   ⟷   Cost   ⟷   Total US
Algorithms   ATLAS
                                      Budget

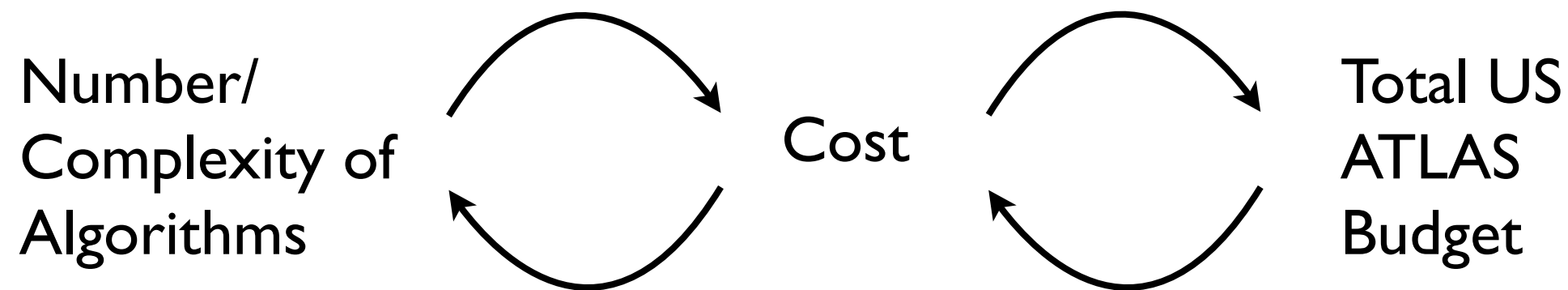We don't have a fixed set of algorithms/tasks
We don't have a fixed budget
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L1 Global Planning

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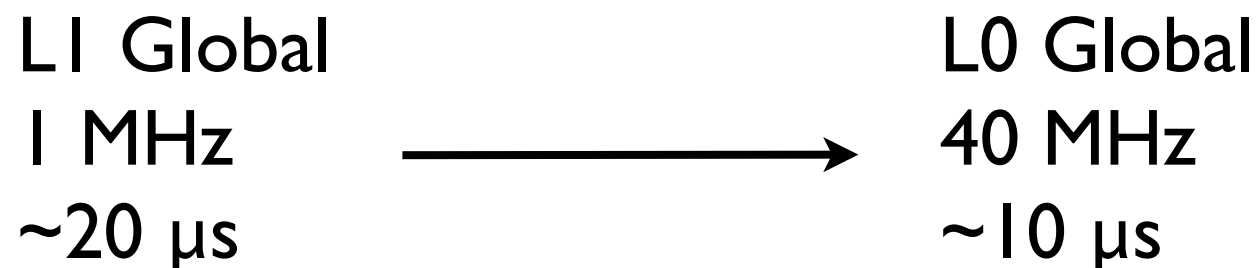
L1 Global Planning

More complexity...

A single level trigger option with 1 MHz readout to the HLT will be added to the IDR draft
- In principle this removes the need for the L1 Global

Several people are proposing to instead migrate the L1 Global a new L0 Global to improves hadronic triggering and topological trigger flexibility

L1 Global   L0 Global

1 MHz   ⟶   40 MHz

~20 μs   ~10 μs

Impact: 40 times more data, a few times faster, with simpler algorithms (and presumably more hardware)

L1 Global Planning

"Basis of Estimate" (BoE)
- Official document that describes how we come up with cost numbers

Eventually (late-Dec?) we will have a BoE for each deliverable
- This will need to include institute specific costs and manpower estimates

Short-term we will try to prepare a BoE assuming uniform costs
- Will try to include varying scope and priorities so that we can discuss the budget balance in the scrubbing meeting (Nov 23-24)